Internet Game Addiction, Depression, and Escape From Negative Emotions in Adulthood

A Nationwide Community Sample of Korea

Dong Jun Kim, BS,† Kiwon Kim, MD,* Hae-Woo Lee, MD, PhD,‡ Jin-Pyo Hong, MD, PhD,* Maeng Je Cho, MD, PhD,§ Maurizio Fava, MD,|| David Mischoulon, MD, PhD,|| Jung-Yoon Heo, MD,* and Hong Jin Jeon, MD, PhD*||¶*

Abstract: The aim of this study was to investigate the association between adult Internet game addiction (IGA) and mental disorders. A total of 1401 adults aged between 18 and 74 years participated in this study. The IGA group had significantly younger patients, and it showed a higher proportion of unmarried and unemployed adults, and higher rates of suicidal ideation, plan, and attempt than the non-IGA group. Multivariate logistic regression indicated that IGA was significantly associated with major depressive disorder, dysthymia, and depressive disorders adjusting for all variables. The Patient Health Questionnaire–9 score was significantly higher in the IGA group than in the non-IGA group for both young adults and middle groups. "Escape from negative emotions like nervousness, sadness, and anger" was the only significant item associated with depression among symptoms of IGA. This study suggests that adults with IGA and depression may use Internet games to escape from negative emotions.

Key Words: Internet game addiction, depression, Adult, suicide attempt, emotion

(*J Nerv Ment Dis* 2017;00: 00–00)

Recent advances in Internet networks and smartphones have made it possible for anyone to enjoy Internet games regardless of time and physical location. Massively Multiplayer Online Role-Playing Games and mobile games are of particular interest to players of all ages and both sexes. Internet game addiction (IGA) or Internet gaming disorder is defined as pathological or problematic Internet game use, which includes a person's inability to control his or her use of Internet games (Kuss, 2013). Internet gaming disorder appeared in the appendix of the updated version of the *Diagnostic and Statistical Manual for Mental Disorders, Fifth Edition* (*DSM-5*) for the first time (American Psychiatric Association, 2013), which describes Internet gaming disorder as a type of behavioral addiction that refers to "Persistent and recurrent use of the Internet to engage in games, often with other players, leading to clinically significant impairment or distress."

Previous studies have indicated that children and adolescents in particular are becoming addicted to playing Internet games, in much the same way as adults become addicted to drugs, alcohol, or gambling (Zhou et al., 2012). Previous studies have reported that the prevalence of IGA varied from 0.2% in the German population of all ages (Festl et al., 2013) to 50% among Korean teenagers (Hur, 2006). Previous studies have consistently reported that IGA was associated with various mental disorders such as depression, anxiety, panic disorder, social phobias, attention deficit hyperactivity disorder, and autism spectrum disorder among children and adolescents (Gentile et al., 2011; King et al., 2013; Mazurek and Engelhardt, 2013).

Currently, IGA is a problem not only among children but also among adults, and the reason why they overuse Internet games is still under debate. However, few previous studies have investigated adult IGA. We hypothesized that the community population of adults with IGA had different demographic profiles compared with adults without IGA. Specifically, we proposed that adult IGA may be associated with psychiatric comorbidities; hence, we compared depression and mental disorder rates on adults with and without IGA.

METHODS

Data Sources, Data Collection, and Study Sample

A nationwide study of Korean adults, named the Korean Epidemiologic Catchment Area Study 2011 (KECA-2011) was conducted from July 2011 to September 2011, and a detailed description of the study design has been documented elsewhere (Seoul National University College of Medicine, 2011). Subjects were selected using multistage and cluster sampling designs based on data from the Korean Population Census (Statistics Korea, 2006). In KECA-2011, subjects were sampled across 12 catchment areas: 3 metropolitan districts, 5 districts in midsized cities, and 4 rural counties. One adult who was between 18 and 74 years of age per selected household was chosen at random, and face-to-face interviews were conducted using the Korean version of Composite International Diagnostic Interview (K-CIDI) (Cho et al., 1999). Then, 6027 adults were included from the KECA-2011 populations (overall response rate, 80.2%), and among them, subjects who had played the game for the past year were included in this study. Finally, a total of 1401 adults completed the questionnaires for game addiction–related symptoms.

The institutional review board of Seoul National University College of Medicine approved this study. All subjects were fully informed about the aims and methods of the study before completing the interview, and informed consent was obtained before participation. A total of 78 interviewers were recruited from the catchment areas, including psychiatric nurses, social workers, and medical students with experience in conducting psychiatric epidemiologic surveys. All interviewers

*Department of Psychiatry, Depression Center, Samsung Medical Center, Sungkyunkwan University School of Medicine; †Department of Health Sciences and Technology, Samsung Biomedical Research Institute (SAIHST), Sungkyunkwan University; ‡Department of Psychiatry, Seoul Medical Center; §Department of Psychiatry and Behavioral Sciences, Seoul National University College of Medicine, Seoul, Korea; ||Depression Clinical and Research Program, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts; and ¶Department of Health Sciences & Technology, Department of Medical Device Management and Research, and Department of Clinical Research Design & Evaluation, and SAIHST, Sungkyunkwan University, Seoul, Korea.

Send reprint requests to Hong Jin Jeon, MD, PhD, Department of Psychiatry, Depression Center, Samsung Medical Center, Sungkyunkwan University School of Medicine, 81 Irwon-ro, Gangnam-gu, Seoul 135-710, Korea. E-mail: jeonhj@skku.edu.

All authors have agreed to this submission.

The material is original research, has not been previously published and has not been submitted for publication elsewhere while under consideration.

ISSN: 0022-3018/17/0000–0000

DOI: 10.1097/NMD.0000000000000698

received a 5-day training session that included didactic sessions covering general interviewing skills and the instrument content; mock interviews and role-playing exercises were utilized to facilitate the generalization of new knowledge (World Health Organization, 1997a, 1997b).

Measures

Assessment of *DSM-IV* Disorders

The *DSM-IV* diagnoses are based on the K-CIDI (World Health Organization, 1990), a fully structured diagnostic interview designed to make psychiatric diagnoses (American Psychiatric Association, 1994). The K-CIDI has been validated by Cho et al. (1999) according to the World Health Organization guidelines (World Health Organization, 1997c). Furthermore, clinical diagnosis with blind clinical reinterviews, using the Structured Clinical Interview for the *DSM-IV*, showed good concordance with the K-CIDI diagnoses (κ values between 0.50 and 1.00) (Cho et al., 2002). Finally, the K-CIDI was used in the KECA study, conducted between June 2001 and November 2001 (Cho et al., 2007).

Assessment of IGA

This study used the scale of "problematic game playing" to assess IGA, which was developed after reviewing the *DSM-IV* criteria for substance dependence and for pathological gambling and the literature on the addictions (Tejeiro Salguero and Morán, 2002). It consists of eight dimensions of addiction and their correlates in the nine items with dichotomous yes/no answers during the previous year, such as preoccupation, tolerance, loss of control, withdrawal, escape, lies and deception, disregard for the physical or psychological consequences, and family/schooling disruption, as shown in Table 1. In addition, if someone answered yes on four or more questions, they were classified as addicted. It has acceptable internal consistency (Cronbach's alpha) at 0.69, and construct validity, which indicates that higher total scores in the scale were associated with higher frequency of play (Tejeiro Salguero and Morán, 2002).

Assessment of Depressive Symptoms

Depressive symptoms were assessed by the Korean version of the Patient Health Questionnaire–9 (PHQ-9) (Spitzer et al., 1999). The Korean version of PHQ-9 showed good internal consistency (Cronbach's alpha) at 0.81, the test-retest correlation coefficient (r = 0.89, $p < 0.01$) was relatively high, and correlations of the PHQ-9 with the Hamilton Depression Rating Scale, Quick Inventory of Depressive Symptomatology–Self Rating, and Center for Epidemiologic Studies Depression were 0.70, 0.81, and 0.81, respectively.

Assessment of Lifetime Suicide Attempt

All interviewers asked the subjects about suicide ideation, plans, and attempts in a standard and consistent way by using the following questions. The questions were "Have you ever seriously thought about committing suicide?" for suicidal ideation, "Have you ever made a plan for committing suicide?" for suicidal plan, and "Have you ever attempted suicide?" for suicide attempt (Jeon et al., 2009; Lee et al., 2007). The participants responded to dichotomous questions with "yes" or "no," and then provided information on their age at the first suicide attempt and the number of suicide attempts. The questions showed strong validity between psychiatrists and interviewers who participated in this study, and interrater and test-retest reliability with kappa values between 0.74 and 1.00 in a preliminary study (Cho et al., 2005). Suicidal behavior was defined as suicidal ideation, plan, and attempt. After each question, the age of onset and last suicidal ideation, plan, and attempt were assessed through an open question format.

Statistical Analyses

We divided the subjects into two groups according to the history of IGA. We compared the demographic profiles of the two groups. To reduce the chances of obtaining false-positive results (type I errors) when multiple pairwise tests were performed on a single set of data, Bonferroni corrections were applied by dividing the p value by the number of comparisons being made. Chi-square tests were performed for the comparative analyses of sex, age groups, marital status, education,

TABLE 1. Multivariate Logistic Regression Analysis of Depression[a] With Each Symptom of IGA (N = 1401)

					Depression	
Dimensions	**Items**	**Questions**	***n***	**%**	**AOR**	**95% CI**
Preoccupation	Item 1	When I am not playing video games, I keep thinking about them, *i.e.*, remembering games, planning the next game, etc.	93	6.6	1.2	0.5–2.4
Tolerance	Item 2	I spend an increasing amount of time playing video games	191	13.6	0.87	0.5–1.7
Loss of control	Item 3	I have tried to control, cut back or stop playing, or I usually play video games over a longer period than intended	200	14.3	1.6	0.9–2.9
	Item 6	When I lose a game or I have not obtained the desired results, I need to play again to achieve my target	190	13.6	0.88	0.5–1.7
Withdrawal	Item 4	When I cannot use video games, I get restless or irritable	48	3.5	1.6	0.7–3.8
Escape	Item 5	When I feel bad, for example nervous, sad, or angry, or when I have problems, I use video games more often	126	9.0	4.1	2.3–7.5***
Lies and deception	Item 7	Sometimes I conceal my video game playing from others, *i.e.*, my parents, friends, teachers…	54	3.8	1.4	0.6–3.2
Disregard for the physical or psychological consequences	Item 8	To play video games, I have skipped classes or work, or I have lied, stolen, or had an argument or a fight with someone	35	2.5	2.3	0.9–6.0
Family/schooling disruption	Item 9	Because of video game playing, I have reduced my homework, or schoolwork, or I have not eaten, or I have gone to bed late, or I have spent less time with my friends and family	161	11.5	1.2	0.6–2.4

Adjusted for age, sex, education years, and marital status.

[a]Depression is defined as any MDD, dysthymia, and depressive disorder.

***$p < 0.001$.

occupation, monthly income, and experience of suicide ideation, plan, and attempt (two tailed). Student's *t* tests were performed for analyses of age and years of education (two tailed). Multivariate logistic regression models were used to evaluate the associations between psychiatric comorbidities and IGA and between each dimension of IGA and depression after adjusting for age, sex, education years, and marital status and all listed variables. The adjusted odds ratios (AORs) and 95% confidence intervals (CIs) were estimated for specific depression symptoms and psychiatric comorbidities after adjusting for age, sex, and education years. All analyses were performed with SPSS 11.0.

RESULTS

Demographic Profiles of Subjects With and Without IGA

Of the 1401 subjects, 108 were assessed as having IGA, as shown in Table 2. Prevalence of IGA was estimated to be 7.71% during the previous year. The IGA group had significantly younger patients, and it showed a higher proportion of unmarried and unemployed adults, and higher rates of suicide ideation, plan, and attempt than the group with no IGA, after Bonferroni's correction. Mean age (χ^2 = 6.13, $p < 0.0001$) of the IGA group (27.5 years) was lower than that of the non-IGA group (33.6 years). The IGA group showed a statistically higher proportion of unmarried (69.2%) (χ^2 = 12.6, p = 0.002) and unemployed adults (57.4%) (χ^2 = 14.5, p = 0.001), suicide ideation (37.0%) (χ^2 = 28.6, $p < 0.0001$), suicide plan (18.5%) (χ^2 = 79.1, $p < 0.0001$), and suicide attempt (14.8%) (χ^2 = 35.0, $p < 0.0001$) than the non-IGA group. However, there were no significant differences in education years and monthly income between the two groups.

Psychiatric Comorbidities and IGA

IGA was significantly associated with depression, as shown in Table 3. Multivariate logistic regression analysis showed that IGA was significantly associated with major depressive disorder (MDD) (AOR, 3.3; 95% CI, 1.7–6.1), dysthymia (AOR, 4.8; 95% CI, 1.6–14.9), and depressive disorder (AOR, 5.5; 95% CI, 3.3–9.0), after adjusting for age, sex, education years, marital status, and all variables. However, there was no significant difference between the two groups with respect to alcohol use disorder, psychotic disorder, generalized anxiety disorder (GAD), social phobia, panic disorder, agoraphobia, posttraumatic stress disorder (PTSD), and obsessive-compulsive disorder (OCD). As shown in Figure 1, the PHQ-9 score in the IGA group was higher than that in the non-IGA group over the whole age range.

Escape from Negative Feelings and IGA

As shown in Table 1, only the "escape" dimension was significantly correlated with depression among symptoms of IGA (AOR, 4.1; 95% CI, 2.3–7.5). Of the 1401 subjects, 126 subjects answered that

TABLE 2. Demographic and Clinical Profiles of Community-Dwelling Adults With and Without IGA During the Previous Year (N = 1401)

Profiles	IGA (n = 108)		No IGA (n = 1293)		Statistics t or χ^2	p
Age, mean (SD)	27.5	(8.3)	33.6	(11.8)	6.13	<0.0001
18–29	75	69.4%	562	43.7%	30.8	<0.0001
30–39	24	22.2%	356	27.7%		
40–49	6	5.6%	216	16.8%		
50–59	2	1.9%	114	8.9%		
≥60	1	0.9%	38	3.0%		
Female sex, %	35	32.4%	387	29.9%	0.29	0.59
Marital status, %						
Married	30	28.0%	565	43.7%	12.6	0.002
Divorced/widowed/separated	3	2.8%	64	4.9%		
Unmarried	74	69.2%	664	51.4%		
Education years, mean (SD)	13.3	(2.02)	13.2	(2.7)	0.17	0.86
Education years, %						
No education	0	0.0%	11	0.9%	3.5	0.47
1–6	2	1.9%	29	2.2%		
7–9	3	2.8%	69	5.3%		
10–12	46	42.6%	467	36.1%		
12+	57	52.8%	717	55.5%		
Occupation, %						
Full time	42	38.9%	710	55.3%	14.5	0.001
Part time	4	3.7%	76	5.9%		
Unemployed	62	57.4%	497	38.7%		
Monthly income, %						
<$2000	25	28.4%	326	32.4%	3.4	0.18
$2000–$3000	36	40.9%	316	31.4%		
≥$3000	27	30.7%	365	36.2%		
Suicide						
Suicide ideation	40	37.0%	210	16.4%	28.6	<0.0001
Suicide plan	20	18.5%	28	2.2%	79.1	<0.0001
Suicide attempt	16	14.8%	40	3.1%	35.0	<0.0001

Bonferroni's corrections ($p < 0.05/11 = 0.0045$).

TABLE 3. Multivariate Logistic Regression Analysis of Psychiatric Comorbidities of IGA in Community-Dwelling Adults (*N* = 1401)

	IGA (*n* = 108)		No IGA (*n* = 1293)		Statistics	
Psychiatric Comorbidities	***n***	**%**	***n***	**%**	**AOR**	**95% CI**
MDD	29	26.9	76	5.9	3.3	1.7–6.1***
Dysthymia	9	8.3	13	1.0	4.8	1.6–14.9**
Alcohol use disorder	31	28.7	287	22.2	1.4	0.9–2.3
Psychotic disorder	3	2.8	9	0.7	2.2	0.4–11.6
GAD	7	6.5	33	2.6	1.1	0.4–3.2
Social phobia	3	2.8	15	1.2	0.23	0.04–1.4
Panic disorder	2	1.9	4	0.3	0.42	0.05–3.64
Agoraphobia	6	5.6	6	0.5	2.6	0.6–11.8
PTSD	5	4.6	15	1.2	1.9	0.5–6.9
OCD	2	1.9	8	0.6	1.9	0.3–13.2
Depressive disorders	31	28.7	82	6.3	5.5	3.3–9.0***
Any *DSM-IV* disorders	79	73.8	467	36.3	1.5	1.4–1.7***

Adjusted for age, sex, education years, marital status, and all variables above.
**$p < 0.01$, ***$p < 0.001$.

"When I feel bad, for example nervous, sad, or angry, or when I have problems, I use the video games more often." On the contrary, other dimensions of IGA, such as preoccupation, tolerance, loss of control, withdrawal, lies and deception, disregard for the physical or psychological consequences, and family/schooling disruption, showed no significant association with depression.

DISCUSSION

This is the first study to investigate the association between IGA and depression in a large sample of community-dwelling adults. This study presents the following three important findings: first, the IGA group had significantly younger patients, and it showed a higher proportion of unmarried and unemployed adults, and higher rates of suicide ideation, plan, and attempt than the non-IGA group. Second, adult IGA was significantly associated with depression, and the PHQ-9 scores were higher in the IGA group than in the non-IGA group. Third, "escape from negative emotions" was the only significant item associated with depression, and preoccupation, tolerance, loss of control, withdrawal, lies and deception, disregard for the physical or psychological consequences, and family/schooling disruption were not associated with depression.

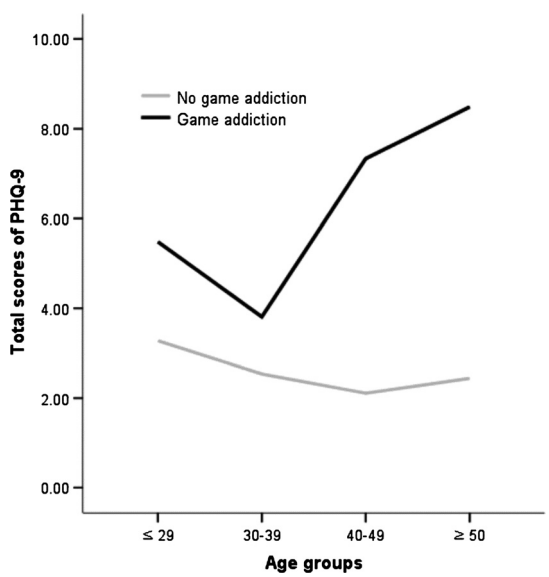

FIGURE 1. Age and severity of depression among community-dwelling adults with and without IGA during the previous year (*N* = 1401).

This study indicated that the prevalence of IGA was estimated to be 7.71% during the previous year among community-dwelling adults, which shows many community-dwelling adults experience IGA. This finding is consistent with previous studies that showed that IGA was prevalent not only in adolescents, but also in young and older adults. Scharkow et al. (2014) reported that the prevalence of problematic gaming was 3.3% in young adults and 2.8% in older adults, compared with 8.9% in adolescents, although this study used computer-assisted telephone interviews (Scharkow et al., 2014). This study indicated that subjects with IGA were younger, unmarried and unemployed, and especially had more than four times higher rates of suicide attempts. Although previous studies have revealed that excessive computer game playing increased suicide ideation in adolescents (Rehbein et al., 2010) and adults (Wenzel et al., 2009), this study suggests an association between suicide attempt and IGA.

A unique finding of this study is that adult IGA was strongly associated with depression including MDD, dysthymia, and depressive disorders, but not with alcohol use disorder. "Escape from negative emotions" was the only significant item associated with depression IGA. This finding suggests that community-dwelling adults with IGA preoccupy themselves with Internet games as a solution for their depression rather than it being a problem of behavioral addiction because depression showed no significant associations with tolerance and withdrawal of their gaming behaviors, as shown in Table 1. Korean culture has a very permissive attitude toward alcohol use disorders; hence, the prevalence of alcohol dependence is greater in Korea (5.1%) compared with the United States (4.4%) (Lee et al., 2010). This study indicated that IGA was more strongly associated with depression than with alcohol use disorder.

This study also indicated that subjects with IGA showed more severe depression than those without IGA among all age groups. It is still controversial whether the amount of time spent on video games is associated with higher levels of depression (Gentile et al., 2011; King et al., 2013; Mentzoni et al., 2011), and some previous studies have reported that spending time playing video games does not involve

negative consequences in adolescents (Brunborg et al., 2014) and exposure to video game violence was not related to any of the negative outcomes such as depression and antisocial personality traits (Ferguson et al., 2012). It is important that previous studies that showed no association with depression or negative outcomes focused on the amount of time spent, the type of game played, and adolescents as the population of interest, whereas the other studies focused more on addiction and all ages. This study provides additional evidence for the association between depression and IGA among community-dwelling adults.

Suicide prevention is an important social issue in South Korea. South Korea is listed as having the third highest suicide rate among 105 countries according to the 2011 World Health Organization Suicide prevention data (World Health Organization, 2013). Previous studies have revealed that depression is significantly associated with suicidal ideation and attempts in South Korea (Jeon et al., 2010a; Jeon et al., 2010b), and feelings of worthlessness are more strongly associated with suicide attempts than other depression symptoms in individuals with MDD (Jeon et al., 2014). This study suggested that adult IGA may be associated with suicidal ideation, attempt, and depression.

There are several limitations to the present study that should be considered when interpreting the findings. First, this was a cross-sectional survey, in which information about IGA and psychiatric comorbidities was based on retrospective reports. Therefore, recall bias might have affected the accuracy of the data (Patten, 2003). Second, underreporting (false negatives) in the questionnaires could have resulted in underestimation of the true prevalence of IGA. Third, nonresponsiveness to the interview may also have affected the results, as it has been previously reported that nonrespondents have higher rates of mental disorders than respondents (de Graaf et al., 2000; Eaton et al., 1992). Fourth, we did not evaluate Internet game use based on the time spent and types of IGA because longer time of Internet game use is expected to increase the likelihood of addiction (Wei et al., 2012).

In conclusion, adult IGA is significantly associated with depression, compared with other mental disorders such as alcohol use disorder and anxiety disorders. Individuals with depression have negative emotions including not only depressed mood and sadness but also nervousness and anger. This study suggests that IGA may be a way to escape from depression, and not from alcohol use disorder or behavioral addiction. Although further research on treatment of adult IGA should be conducted, it is important to assess and treat depressive syndromes such as MDD, dysthymia, and depressive disorder if someone has adult IGA.

ACKNOWLEDGMENT

The authors wish to express their gratitude to 12 local investigators and 78 interviewers.

Professor Maeng Je Cho was a principal investigator of the Korean Epidemiologic Catchment Area Study Replication (KECA-R). Professors Hong Jin Jeon, Jin Pyo Hong, and Maeng Je Cho were investigators of the study. They designed the study, educated and supervised the interviewers, and checked the whole data. Professor Hong Jin Jeon and Dr Kiwon Kim analyzed the data and wrote the manuscript. Professor Maurizio Fava, Professor David Mischoulon, and Dr Jung-Yoon Heo supervised the data analysis and manuscript writing.

DISCLOSURE

This study was supported by a grant from the Korean Mental Health Technology R&D Project, Ministry of Health & Welfare, Republic of Korea (no. HM14C2567). This work was partly supported by the Institute for Information & Communications Technology Promotion (IITP) grant funded by the Korea government (MSIP) (no. B0132-15-1003, the development of skin adhesive patches for the monitoring and prediction of mental disorders), and by the Original Technology Research Program for Brain Science through the National Research Foundation of Korea (NRF) funded by the Ministry of Education, Science and Technology (no. NRF-2016M3C7A1947307; PI, Hong Jin Jeon).

The Korean Ministry of Health & Welfare and the NRF had no further role in the study design; in the collection, analysis, and interpretation of data; in the writing of the report; and in the decision to submit the paper for publication.

Dr Mischoulon has received research support from Fisher Wallace, Nordic Naturals, Methylation Sciences Inc, and PharmoRx Therapeutics. He has received honoraria for speaking from the Massachusetts General Hospital Psychiatry Academy. He has received royalties from Lippincott Williams & Wilkins for the published book Natural Medications for Psychiatric Disorders: Considering the Alternatives.

REFERENCES

American Psychiatric Association (1994) *Diagnostic and statistical manual of mental disorders* (4th ed). Washington, DC: American Psychiatric Press.

American Psychiatric Association (2013) *The diagnostic and statistical manual of mental disorders: DSM-5* (5th ed). Washington, DC: American Psychiatric Association.

Brunborg GS, Mentzoni RA, Frøyland LR (2014) Is video gaming, or video game addiction, associated with depression, academic achievement, heavy episodic drinking, or conduct problems? *J Behav Addict*. 3:27–32.

Cho MJ, Hahm BJ, Bae JN, Suh TW, Lee DW, Cho SJ, Kim JK (1999) *Development of the Korean version of Composite International Diagnostic Interview. Annual meeting of the Korean Neuropsychiatric Association*. Seoul: Korean Neuropsychiatric Association.

Cho MJ, Hahm BJ, Suh DW, Hong JP, Bae JN, Cho SJ, Park JI, Lee JY, Lee DW, Jeon HJ (2005) *A preliminary study for the 2006 National Survey of Psychiatric Illness*. Seoul: Seoul National University.

Cho MJ, Hahm BJ, Suh DW, Hong JP, Bae JN, Kim JK, Lee DW, Cho SJ (2002) Development of Korean Version of the Composite International Dianostic Interview (K-CIDI). *J Korean Neuropsychiatric Assoc*. 41:123–137.

Cho MJ, Kim JK, Jeon HJ, Suh T, Chung IW, Hong JP, Bae JN, Lee DW, Park JI, Cho SJ, Lee CK, Hahm BJ (2007) Lifetime and 12-month prevalence of *DSM-IV* psychiatric disorders among Korean adults. *J Nerv Ment Dis*. 195:203–210.

de Graaf R, Bijl RV, Smit F, Ravelli A, Vollebergh WA (2000) Psychiatric and sociodemographic predictors of attrition in a longitudinal study: The Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Am J Epidemiol*. 152:1039–1047.

Eaton WW, Anthony JC, Tepper S, Dryman A (1992) Psychopathology and attrition in the epidemiologic catchment area surveys. *Am J Epidemiol*. 135:1051–1059.

Ferguson CJ, San Miguel C, Garza A, Jerabeck JM (2012) A longitudinal test of video game violence influences on dating and aggression: A 3-year longitudinal study of adolescents. *J Psychiatr Res*. 46:141–146.

Festl R, Scharkow M, Quandt T (2013) Problematic computer game use among adolescents, younger and older adults. *Addiction*. 108:592–599.

Gentile DA, Choo H, Liau A, Sim T, Li D, Fung D, Khoo A (2011) Pathological video game use among youths: A two-year longitudinal study. *Pediatrics*. 127:e319–e329.

Hur MH (2006) Demographic, habitual, and socioeconomic determinants of Internet addiction disorder: An empirical study of Korean teenagers. *Cyberpsychol Behav*. 9:514–525.

Jeon HJ, Lee JY, Lee YM, Hong JP, Won SH, Cho SJ, Kim JY, Chang SM, Lee D, Lee HW, Cho MJ (2010a) Lifetime prevalence and correlates of suicidal ideation, plan, and single and multiple attempts in a Korean nationwide study. *J Nerv Ment Dis*. 198:643–646.

Jeon HJ, Lee JY, Lee YM, Hong JP, Won SH, Cho SJ, Kim JY, Chang SM, Lee HW, Cho MJ (2010b) Unplanned versus planned suicide attempters, precipitants, methods, and an association with mental disorders in a Korea-based community sample. *J Affect Disord*. 127:274–280.

Jeon HJ, Park JI, Fava M, Mischoulon D, Sohn JH, Seong S, Park JE, Yoo I, Cho MJ (2014) Feelings of worthlessness, traumatic experience, and their comorbidity in relation to lifetime suicide attempt in community adults with major depressive disorder. *J Affect Disord*. 166:206–212.

Jeon HJ, Roh MS, Kim KH, Lee JR, Lee D, Yoon SC, Hahm BJ (2009) Early trauma and lifetime suicidal behavior in a nationwide sample of Korean medical students. *J Affect Disord*. 119:210–214.

King DL, Delfabbro PH, Zwaans T, Kaptsis D (2013) Clinical features and axis I comorbidity of Australian adolescent pathological Internet and video game users. *Aust N Z J Psychiatry*. 47:1058–1067.

Kuss DJ (2013) Internet gaming addiction: Current perspectives. *Psychol Res Behav Manag*. 6:125–137.

Lee HK, Chou SP, Cho MJ, Park JI, Dawson DA, Grant BF (2010) The prevalence and correlates of alcohol use disorders in the United States and Korea—A cross-national comparative study. *Alcohol*. 44:297–306.

Lee S, Fung SC, Tsang A, Liu ZR, Huang YQ, He YL, Zhang MY, Shen YC, Nock MK, Kessler RC (2007) Lifetime prevalence of suicide ideation, plan, and attempt in metropolitan China. *Acta Psychiatr Scand*. 116:429–437.

Mazurek MO, Engelhardt CR (2013) Video game use in boys with autism spectrum disorder, ADHD, or typical development. *Pediatrics*. 132:260–266.

Mentzoni RA, Brunborg GS, Molde H, Myrseth H, Skouverøe KJ, Hetland J, Pallesen S (2011) Problematic video game use: Estimated prevalence and associations with mental and physical health. *Cyberpsychol Behav Soc Netw*. 14:591–596.

Patten SB (2003) Recall bias and major depression lifetime prevalence. *Soc Psychiatry Psychiatr Epidemiol*. 38:290–296.

Rehbein F, Kleimann M, Mössle T (2010) Prevalence and risk factors of video game dependency in adolescence: Results of a German nationwide survey. *Cyberpsychol Behav Soc Netw*. 13:269–277.

Scharkow M, Festl R, Quandt T (2014) Longitudinal patterns of problematic computer game use among adolescents and adults—A 2-year panel study. *Addiction*. 109: 1910–1917.

Seoul National University College of Medicine (2011) *The Epidemiological Survey of Mental Disorders in Korea*. Seoul: Korean Ministry of Health and Welfare.

Spitzer RL, Kroenke K, Williams JB (1999) Validation and utility of a self-report version of PRIME-MD: The PHQ primary care study. Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire. *JAMA*. 282: 1737–1744.

Statistics Korea (2006) *2005 Population and Housing Census Report*. Daejeon: Statistics Korea.

Tejeiro Salguero RA, Morán RM (2002) Measuring problem video game playing in adolescents. *Addiction*. 97:1601–1606.

Wei HT, Chen MH, Huang PC, Bai YM (2012) The association between online gaming, social phobia, and depression: An internet survey. *BMC Psychiatry*. 12:92.

Wenzel HG, Bakken IJ, Johansson A, Götestam KG, Øren A (2009) Excessive computer game playing among Norwegian adults: Self-reported consequences of playing and association with mental health problems. *Psychol Rep*. 105: 1237–1247.

World Health Organization (1990) *Composite International Diagnostic Interview (CIDI), Version 1.0*. Geneva, Switzerland: World Health Organization.

World Health Organization (1997a) *CIDI, core version 2.1 interviewer's manual* (pp 1–114). Geneva: World Health Organization.

World Health Organization (1997b) *CIDI, core version 2.1 trainer's manual* (pp 1–244). Geneva: World Health Organization.

World Health Organization (1997c) *Procedures for the development of new language versions of the WHO Composite International Diagnostic Interview (WHO-CIDI)*. Geneva, Switzerland: World Health Organization.

World Health Organization (2013) *Suicide prevention (SUPRE)—The WHO worldwide initiative for the prevention of suicide*. Geneva: World Health Organization.

Zhou Z, Yuan G, Yao J (2012) Cognitive biases toward Internet game-related pictures and executive deficits in individuals with an Internet game addiction. *PLoS One*. 7:e48961.